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**COMBINED NOTICE OF APPEAL FROM THE PRIMARY EXAMINER TO THE  
BOARD OF PATENT APPEALS AND INTERFERENCES & PETITION FOR  
EXTENSION OF TIME UNDER 37 C.F.R. 1.136(a) (Large Entity)**

Docket No.  
1555A1/RC

In Re Application Of: Michael O. Okoroafor, Robert A. Smith, Rifat Tabakovic, Marvin J. Graham and Robert D. Herold

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PATENT & TRADEMARK OFFICE  
Application No.

Application No. 09/695,325	Filing Date 10/25/2000	Examiner Rabon A. Sergent	Customer No. 24959	Group Art Unit 1711	Confirmation No. 1203
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# **Invention: METHOD OF PREPARING AN OPTICAL POLYMERIZATE**

**COMMISSIONER FOR PATENTS:**

This is a combined Notice of Appeal from the Primary Examiner to the Board of Patent Appeals and Interferences and petition under the provisions of 37 CFR 1.136(a) to extend the period for filing a response to the Office Action of  
05/19/2005 in the above-identified application.

*Date*

Applicant(s) hereby appeal(s) to the Board of Patent Appeals and Interferences from the decision of the Primary Examiner dated January 11, 2005 finally rejecting Claim(s)

**Applicant(s) hereby request(s) an extension of time of (check desired time period):**

One month       Two months       Three months       Four months       Five months

from: **08/11/2005** *Date* until: **10/11/2005** *Date*

The fee for the Notice of Appeal and Extension of Time has been calculated as shown below:

10/12/2005 HDESTA1 00000066 162025 09695325 Fee for Notice of Appeal: \$500.00

01 EC-1401 500.00 PA

**TOTAL FEE FOR NOTICE OF APPEAL AND EXTENSION OF TIME:** \$950.00

The fee for the Notice of Appeal and extension of time is to be paid as follows:

- A check in the amount of \_\_\_\_\_ for the Notice of Appeal and extension of time is enclosed.

Please charge Deposit Account No. 16-2025 in the amount of \$950.00

The Director is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No.

Any additional filing fees required under 37 C.F.R. 1.16.

Any patent application processing fees under 37 CFR 1.17.

If an additional extension of time is required, please consider this a petition therefor and charge any additional fees which may be required to Deposit Account No. \_\_\_\_\_.

Payment by credit card. Form PTO-2038 is attached.

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

COMBINED NOTICE OF APPEAL FROM THE PRIMARY EXAMINER TO THE  
BOARD OF PATENT APPEALS AND INTERFERENCES & PETITION FOR  
EXTENSION OF TIME UNDER 37 C.F.R. 1.136(a) (Large Entity)

Docket No.  
1555A1/RC



In Re Application Of: Michael O. Okoroafor, Robert A. Smith, Rifat Tabakovic, Marvin J. Graham and Robert D. Herold

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
09/695,325	10/25/2000	Rabon A. Sargent	24959	1711	1203

Invention: METHOD OF PREPARING AN OPTICAL POLYMERIZATE

TO THE COMMISSIONER FOR PATENTS:

This combined Notice of Appeal from the Primary Examiner to the Board of Patent Appeals and Interferences and petition for extension of time under 37 CFR 1.136(a) is respectfully submitted by the undersigned:

Signature

Dated: October 7, 2005

Carol A. Marmo, Esquire  
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of: : PATENT APPLICATION  
Michael O. Okoroafor et al. :  
  
Serial No. 09/695,325 : Group Art Unit: 1711  
  
Filed: October 25, 2000 : Examiner: Rabon A. Sergent  
  
For: METHOD OF PREPARING AN : Docket No.: 1555A1/RC  
OPTICAL POLYMERIZATE :  
:

**BRIEF ON APPEAL**

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

In response to the Office Action mailed May 19, 2005, this Appeal Brief is filed in compliance with 37 CFR 41.37©. Appellants file this Appeal Brief with the Board of Appeals and Interferences based on the rejections made in the Office Action mailed January 11, 2005. Please charge any additional fees or credit overpayment to Deposit Account No. 16-2025.

**REAL PARTY IN INTEREST**

The application has been assigned to PPG Industries Ohio, Inc., Cleveland, Ohio.

**RELATED APPEALS AND INTERFERENCES**

An appeal has been simultaneously filed in a Continuation-In-Part application relating to this patent case, having Serial Number 09/695,332 filed on October 25, 2000.

**STATUS OF CLAIMS**

Claims 1-103 are pending. Claims 1-103 are rejected and appealed.

## STATUS OF AMENDMENTS

An Amendment After Final Rejection dated March 30, 2005, was filed by Appellants. An Advisory Action dated May 23, 2005 was received and the request for reconsideration was considered but did not place the application in condition for allowance.

## SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is directed to a method of preparing a non-elastomeric polymerate comprising the step of polymerizing a two-component composition comprised of:

- (a) a first component containing at least one reactant having at least two functional groups selected from isocyanate, isothiocyanate or combinations thereof, the reactant being the reaction product of,
  - (i) a polythiol monomer having at least two thiol groups; and
  - (ii) a monomer having at least two functional groups selected from isocyanate, isothiocyanate or combinations thereof; and
- (b) a second component containing at least one polyamine reactant having at least two functional groups selected from primary amine, secondary amine or combinations thereof. In the specification see page 3, lines 11 through 21, which provides support for the claimed method of preparing a polymerate that comprises the first and second components recited above. Further, in the specification, see page 4, lines 14-22 and page 20, line 22 to page 21, line 2, which provide support for the non-elastomeric limitation in the claimed invention.

## GROUND OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 1-103 stand rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.
2. Claims 1-103 stand rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

## ARGUMENT

### Rejection of Claims 1-103 under 35 U.S.C. 112, First Paragraph, Written Description Requirement

Claims 1-103 were rejected under 35 U.S.C. 112, first paragraph as allegedly failing to comply with the written description requirement. The Examiner states that the claims allegedly contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors at the time the application was filed, had possession of the claimed invention.

The Examiner states that Appellants have allegedly failed to provide support for claiming that the polymerizate is non-elastomeric.

Appellants submit that several general rules have emerged from the Federal Circuit regarding the written description requirement. First, the subject matter of the claim need not be described literally or "in ipsius verbis" in order for the specification to satisfy the description requirement. *See, e.g., Cordis Corp. v. Medtronic Ave., Inc.*, 339 F.3d 1352 (Fed. Cir.), *reh'g denied*, 2003 U.S. App. LEXIS 22508 (2003); *In re Lukach*, 442 F.2d 967, 969, 169 U.S.P.Q. 795, 796 (C.C.P.A. 1971). Furthermore, it is sufficient that the specification "convey clearly to those skilled in the art the information that the appellant has invented the specific subject matter later claimed." *See, e.g., In re Wertheim*, 541 F.2d 257, 262, 191 U.S.P.Q. 90, 96 (C.C.P.A. 1976); *In re Ruschig*, 379 F.2d 990, 996, 154 U.S.P.Q. 118, 123 (C.C.P.A. 1967).

The Examiner states that Appellants have allegedly failed to adequately define what is meant by "non-elastomeric" and have failed to delineate how or what properties are governed by the language. Appellants submit that the term "non-elastomeric" has an ordinary meaning and thus, the term "non-elastomeric" would be clearly understood by one having ordinary skill in the art. The term "elastomer" has been defined as polymer(s) having "...the ability to be stretched to at least twice their original length and to retract very rapidly to approximately their original length when released. Among the better-known elastomers introduced since the 1930's are styrene-butadiene copolymer, polychloroprene (neoprene), nitrile rubber, butyl rubber, polysulfide rubber,..." (See *The Condensed Chemical Dictionary, Tenth Edition*). Thus, Appellants submit that the term

“non-elastomeric” would mean polymer(s) that do not have the ability to be stretched to at least twice their original length and are unable to retract very rapidly to approximately their original length when released.

The specification (see page 4, lines 16-22) discloses that the polymerizate of the invention has an initial Barcol hardness of at least 1. The term “hardness” has an ordinary meaning in the art. The term “hardness” has been defined as “The resistance of a material to deformation of an indenter of specific size and shape under a known load.” (See *The Condensed Chemical Dictionary, Tenth Edition*). In the specification, Examples 2, 3 and 4 describe the preparation of plastic sheets. On page 26, lines 14- 15, it is disclosed that “The examples demonstrate the excellent high refractive index, high Abbe number and hardness (impact resistance) of the polymerizate of the present invention.”

Moreover, the specification (see page 20, lines 24-27) discloses that the polymerizate of the invention has good impact resistance. The term “impact resistance/strength” has an ordinary meaning in the art. The term “impact strength” has been defined as “The ability of a material to accept a sudden blow or shock without fracture or other substantial damage, measured by standard impact-testing equipment.” (See *The Condensed Chemical Dictionary, Tenth Edition*).

Furthermore, the specification discloses that polymerizates prepared in accordance with the claimed invention will be solid and suitable for optical or ophthalmic applications, such as optical lenses, ophthalmic lenses, sun lenses, windows, automotive transparencies and aircraft transparencies (see the specification page 20, line 22 to page 21, line 2).

Based on the disclosure in the specification of the above-mentioned characteristics of the claimed invention (e.g., hardness, impact strength, hardness, etc.) and the ordinary meaning of the term “non-elastomeric”, Appellants submit that adequate support and guidance is clearly provided in the specification for claiming a non-elastomeric polymerizate.

Rejection of Claims 1-103 under 35 U.S.C. 112,  
First Paragraph, Enablement Requirement

The Examiner rejected claims 1-103 under 35 U.S.C. 112, first paragraph, as allegedly failing to comply with the enablement requirement. The Examiner states that the claims allegedly contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Appellants submit that the Federal Circuit has had an opportunity to decide a number of enablement issues. "The enablement requirement is satisfied when one skilled in the art, after reading the specification, could practice the claimed invention without undue experimentation." *AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1244 (Fed. Cir. 2003), citing *In re Wands*, 858 F.2d 731, 736-37 (Fed. Cir. 1988).

The Examiner has stated that all polythiourethanes have some degree of flexibility or elasticity; however, Appellants have failed to provide enablement for production of polythiourethanes lacking all elastomeric properties.

Appellants submit that adequate guidance which would enable one of ordinary skill in the art to make and use the claimed non-elastomeric polymerizate is clearly provided in the specification. The specification is directed to preparation of a polymerizate by polymerizing a two-component composition. The specification includes a detailed disclosure of the various materials used in preparing the two-component composition, the means of polymerizing the composition, and the characteristics of the resultant polymerizate (see page 4, lines 16-22, page 20, lines 24-27, and page 20, line 22 to page 21, line 2). Appellants submit that in view of the specification, one of ordinary skill in the art could clearly practice the claimed invention without undue experimentation and therefore, the enablement requirement is clearly satisfied.

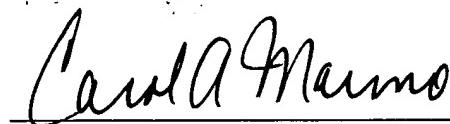
Moreover, the term "elastomer" and thus, "non-elastomeric", has an ordinary meaning. The term "elastomer" has been defined as polymer(s) having "...the ability to be stretched to at least twice their original length and to retract very rapidly to approximately their original length when released. Among the better-known elastomers introduced since the 1930's are styrene-butadiene copolymer, polychloroprene

(neoprene), nitrile rubber, butyl rubber, polysulfide rubber,..." (See *The Condensed Chemical Dictionary, Tenth Edition*). Thus, Appellants submit that the term "non-elastomeric" would be defined as polymer(s) that do not have the ability to be stretched to at least twice their original length and are unable to retract very rapidly to approximately their original length when released.

Furthermore, on page 20, line 11, it is disclosed that various conventional additives such as but not limited to flexibilizing additives can be added to the composition. Appellants submit that this disclosure provides support for the resultant polymerizate not being a flexible material. If a flexible material is desired, a flexibilizing additive can be added to produce such a polymerizate.

For all of the above reasons, it is respectfully requested that the case be remanded to the Examiner for issuance of a Notice of Allowance.

Respectfully submitted,



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October 7, 2005



## CLAIMS APPENDIX

1. (previously presented): A method of preparing a non-elastomeric polymerizate comprising the step of polymerizing a two-component composition comprised of:

(a) a first component containing at least one reactant having at least two functional groups selected from isocyanate, isothiocyanate or combinations thereof, the reactant being the reaction product of,

(i) a polythiol monomer having at least two thiol groups; and

(ii) a monomer having at least two functional groups selected from isocyanate, isothiocyanate or combinations thereof; and

(b) a second component containing at least one polyamine reactant having at least two functional groups selected from primary amine, secondary amine or combinations thereof.

2. (original): The method of claim 1 wherein said first component further comprises (iii) a reactive hydrogen material having at least two reactive hydrogen groups, the reactive hydrogen material being selected from the group consisting of polyols and materials having both hydroxyl and thiol groups; and mixtures thereof.

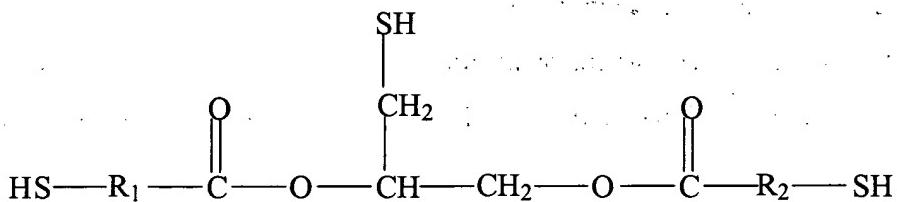
3. (original): The method of claim 1 wherein the relative amounts of (i) and (ii) in said first component are selected such that the molar equivalents ratio of (NCO + NCS)/(SH) is greater than 1.0.

4. (original): The method of claim 2 wherein the relative amounts of (i), (ii) and (iii) being in said first component are selected such that the molar equivalents ratio of (NCO + NCS)/(SH + OH) is greater than 1.0.

5. (original): The method of claim 1 wherein said first component and said second component are selected such that when they are polymerized, the resulting polymerizate has a refractive index of at least 1.6, an Abbe number of at least 33 and an initial Barcol hardness of at least 1.

6. (original): The method of claim 2 wherein the relative amounts of (i), (ii) and (iii) are selected such that the molar equivalents ratio of  $(\text{NCO} + \text{NCS})/(\text{SH} + \text{OH})$  is from 1.2:1.0 to 4.0:1.0.

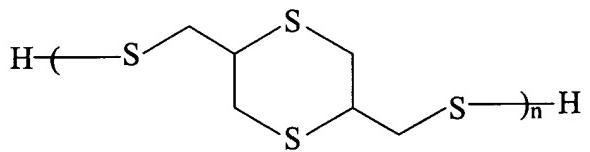
7. (original): The method of claim 1 wherein said polythiol monomer is selected from the group consisting of 2,5-dimercaptomethyl-1,4-dithiane, 2,2'-thiodiethanethiol, pentaerythritol tetrakis(3-mercaptopropionate), pentaerythritol tetrakis(2-mercaptopropionate), trimethylolpropane tris(3-mercaptopropionate), trimethylolpropane tris(2-mercaptopropionate), 4-mercaptopethyl-3,6-dithia-1,8-octanedithiol, 4-tert-butyl-1,2-benzenedithiol, 4,4'-thiodibenzene, benzene, ethylene glycol di(2-mercaptopropionate), ethylene glycol di(3-mercaptopropionate), poly(ethylene glycol) di(2-mercaptopropionate) and poly(ethylene glycol) di(3-mercaptopropionate), a polythiol represented by the general formula:



wherein R<sub>1</sub> and R<sub>2</sub> are each independently selected from straight or branched chain alkylene, cyclic alkylene, phenylene and C<sub>1</sub>-C<sub>9</sub> alkyl substituted phenylene, and oligomers of said polythiols; and mixtures of said polythiol monomers.

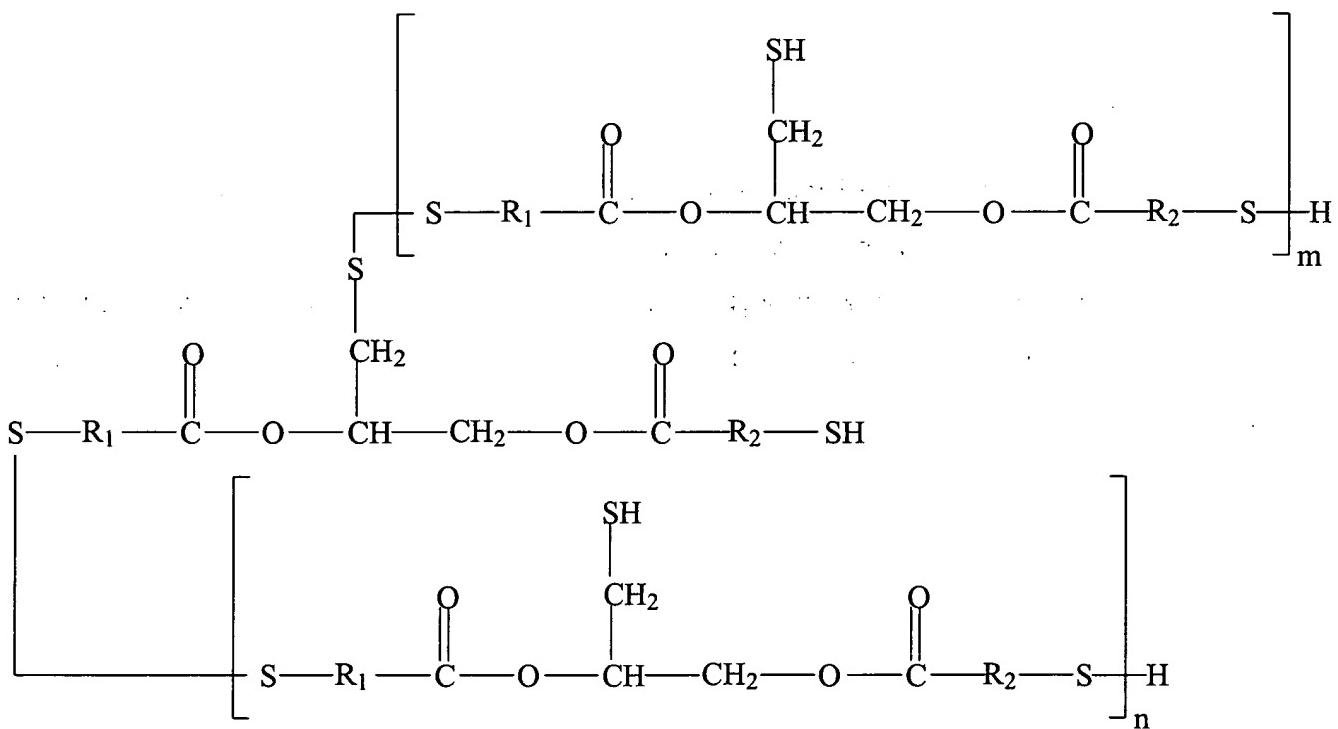
8. (original): The method of claim 7, wherein said polythiol oligomer has disulfide linkages and is prepared by reacting a polythiol monomer, with sulfur, in the presence of a basic catalyst.

9. (original): The method of claim 7 wherein said polythiol oligomer is represented by the general formula:



wherein n is an integer from 1 to 21.

10. (previously presented): The method of claim 7 wherein said polythiol oligomer is represented by the general formula:

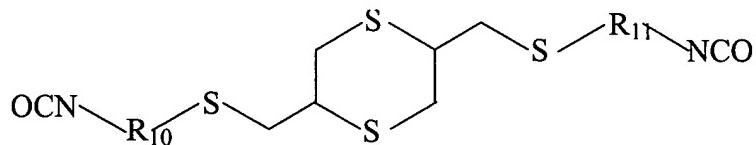


wherein R<sub>1</sub> and R<sub>2</sub> are each independently selected from straight or branched chain alkylene, cyclic alkylene, phenylene or C<sub>1</sub>-C<sub>9</sub> alkyl substituted phenylene and n and m are independently integers from 0 to 21 such that n + m is at least 1.

11. (previously presented): The method of claim 1 wherein said monomer is a material having at least two isocyanate groups.

12. (previously presented): The method of claim 1 wherein said monomer is a material having one or more sulfur atoms in its backbone.

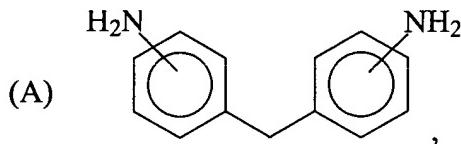
13. (previously presented): The method of claim 12 wherein the monomer having one or more sulfur atoms in its backbone is one having the general structure:



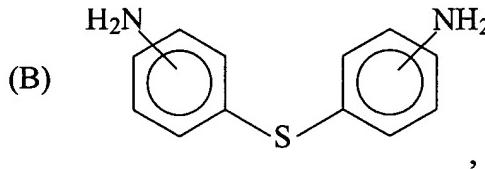
wherein R<sub>10</sub> and R<sub>11</sub> are each independently C<sub>1</sub> to C<sub>3</sub> alkyl.

14. (previously presented): The method of claim 11 wherein said monomer is selected from the group consisting of  $\alpha,\alpha'$ -xylene diisocyanate,  $\alpha,\alpha,\alpha',\alpha'$ -tetramethylxylene diisocyanate, isophorone diisocyanate, bis(isocyanatocyclohexyl)methane, ortho-toluidine diisocyanate, ortho-tolylidine diisocyanate, ortho-tolylene diisocyanate and 4,4'-diphenylmethane diisocyanate, and mixtures of said monomers.

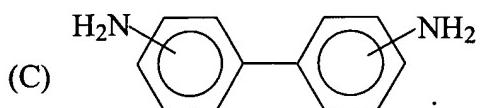
15. (original): The method of claim 1 wherein said polyamine reactant of said second component is selected from the group consisting of ethylenamines, C<sub>1</sub>-C<sub>3</sub> dialkyl toluediamine, methylene dianiline, trimethyleneglycol di(para-aminobenzoate), a diamine represented by the general formula (A):



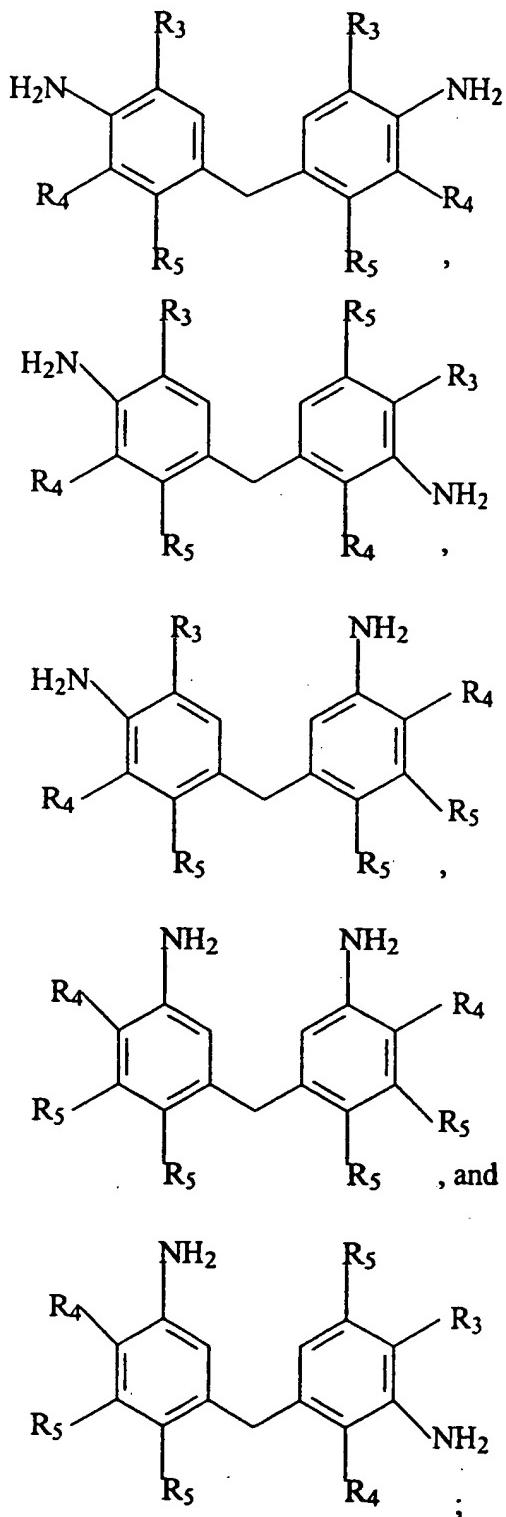
a diamine represented by the general formula (B):



and a diamine represented by the general formula (C):

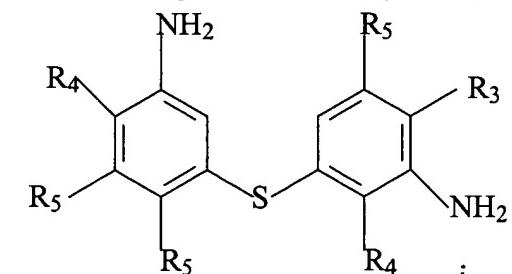
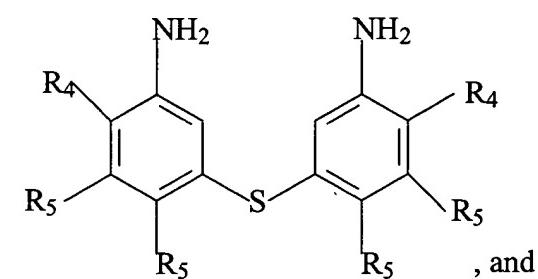
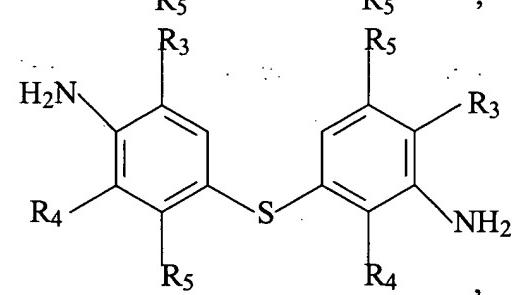
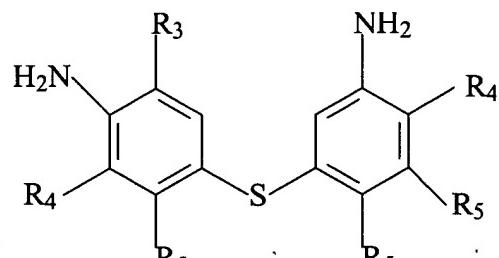
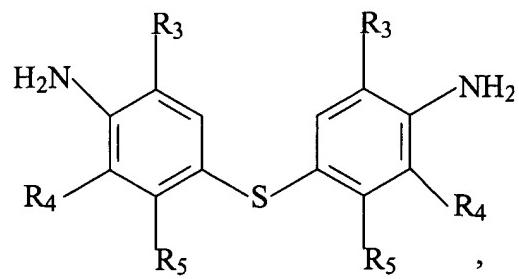


16. (original): The method of claim 15 wherein the diamine of general formula (A) is selected from one or more of the group consisting of:



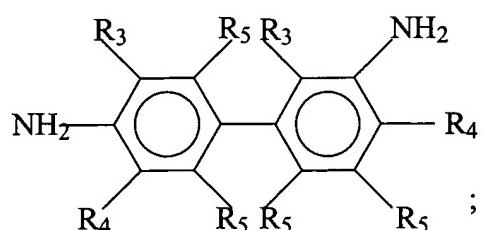
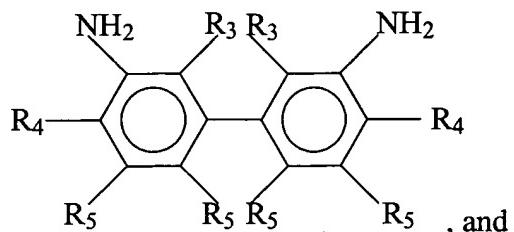
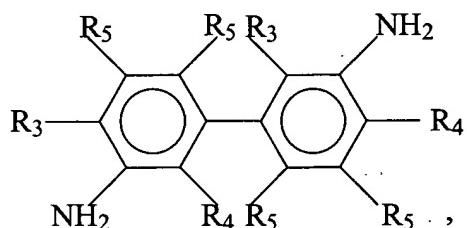
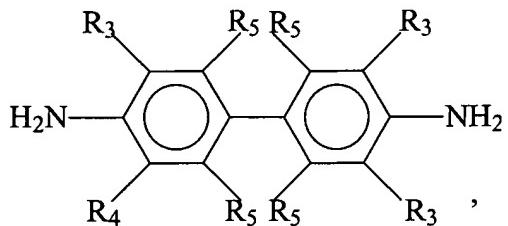
wherein R<sub>3</sub> and R<sub>4</sub> are each independently C<sub>1</sub>-C<sub>3</sub> alkyl, and R<sub>5</sub> is selected from hydrogen and halogen, and mixtures of said diamines.

17. (original): The method of claim 15 wherein the diamine of general formula (B) is selected from one or more of the group consisting of:



wherein R<sub>3</sub> and R<sub>4</sub> are each independently C<sub>1</sub>-C<sub>3</sub> alkyl, and R<sub>5</sub> is selected from hydrogen and halogen, and mixtures of said diamines.

18. (original): The method of claim 15 wherein the diamine of general formula (C) is selected from one or more of the group consisting of:



wherein R<sub>3</sub> and R<sub>4</sub> are each independently C<sub>1</sub>-C<sub>3</sub> alkyl, and R<sub>5</sub> is selected from hydrogen and halogen, and mixtures of said diamines.

19. (original): The method of claim 1 further comprising the step of adding a catalyst to said two-component composition.

20. (original): The method of claim 16 wherein said catalyst is selected from the group consisting of tertiary amines and organometallic compounds.

21. (original): The method of claim 1 further comprising the step of : mixing said first component and said second component.

22. (original): The method of claim 1 further comprising the step of : degassing said first component.

23. (original): The method of claim 1 further comprising the step of : degassing said second component.

24. (original): The method of claim 21 further comprising the step of : adding the mixture to a mold.

25. (original): The method of claim 24 further comprising the step of : heating the mold and the mixture of said first component and said second component within it.

26. (original): The method of claim 25 wherein said heating step further includes heating the mold and said mixture to a temperature of up to 200°C over a period of from 0.5 to 72 hours.

27. (original): The method of claim 1 wherein said first component and said second component are polymerized together in amounts sufficient to provide a molar equivalent ratio of (NCO + NCS) groups to (-NH<sub>2</sub> + -NH-) groups of from 0.5 to 3.0.

28. (original): The method of claim 1 further comprising the step of adding additives selected from the group consisting of light stabilizers, heat stabilizers, antioxidants, ultraviolet light absorbers, mold release agents, static (non-photochromic) dyes, pigments and flexibilizing additives and anti-yellowing additives; and mixtures of said additives.

29. (original): The method of claim 28 wherein the additives are present in said two component composition, in an amount up to 10% by weight of said two component composition.

30. (original): The method of claim 1 wherein said polymerizate further comprises a photochromic substance.

31. (previously presented): A non-elastomeric polymerizate prepared by polymerizing a two-component composition comprised of:

(a) a first component containing at least one reactant having at least two functional groups selected from isocyanate, isothiocyanate or combinations thereof, the reactant being the reaction product of,

(i) a polythiol monomer having at least two thiol groups; and  
(ii) a monomer having at least two functional groups selected from isocyanate, isothiocyanate or combinations thereof; and

(b) a second component containing at least one polyamine reactant having at least two functional groups selected from primary amine, secondary amine or combinations thereof.

32. (original): The polymerizate of claim 31 wherein said first component further comprises (iii) a reactive hydrogen material having at least two reactive hydrogen groups, the reactive hydrogen material being selected from the group consisting of polyols and materials having both hydroxyl and thiol groups, and mixtures thereof.

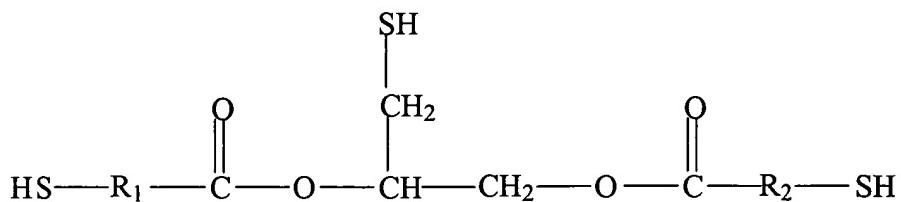
33. (original): The polymerizate of claim 31 wherein the relative amounts of (i) and (ii) in said first component are selected such that the molar equivalents ratio of (NCO + NCS)/(SH) is greater than 1.0.

34. (original): The polymerizate of claim 32 wherein the relative amounts of (i), (ii) and (iii) being in said first component are selected such that the molar equivalents ratio of (NCO + NCS)/(SH + OH) is greater than 1.0.

35. (original): The polymerizate of claim 31 wherein said first component and said second component are selected such that when they are polymerized, the resulting polymerizate has a refractive index of at least 1.6, an Abbe number of at least 33 and an initial Barcol hardness of at least 1.

36. (original): The polymerizate of claim 34 wherein the relative amounts of (i), (ii) and (iii) are selected such that the molar equivalents ratio of (NCO + NCS)/(SH + OH) is from 1.2:1.0 to 4.0:1.0.

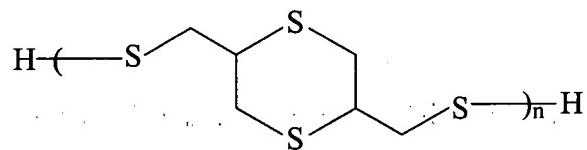
37. (original): The polymerizate of claim 31 wherein said polythiol monomer is selected from the group consisting of 2,5-dimercaptomethyl-1,4-dithiane, 2,2'-thiodiethanethiol, pentaerythritol tetrakis(3-mercaptopropionate), pentaerythritol tetrakis(2-mercaptopropionate), trimethylolpropane tris(3-mercaptopropionate), trimethylolpropane tris(2-mercaptopropionate), 4-mercaptopethyl-3,6-dithia-1,8-octanedithiol, 4-tert-butyl-1,2-benzenedithiol, 4,4'-thiodibenzene-1,2-dithiol, ethylene glycol di(2-mercaptopropionate), ethylene glycol di(3-mercaptopropionate), poly(ethylene glycol) di(2-mercaptopropionate) and poly(ethylene glycol) di(3-mercaptopropionate) and a polythiol represented by the general formula:



wherein R<sub>1</sub> and R<sub>2</sub> are each independently selected from straight or branched chain alkylene, cyclic alkylene, phenylene and C<sub>1</sub>-C<sub>9</sub> alkyl substituted phenylene, and oligomers of said polythiols; and mixtures of said polythiol monomers.

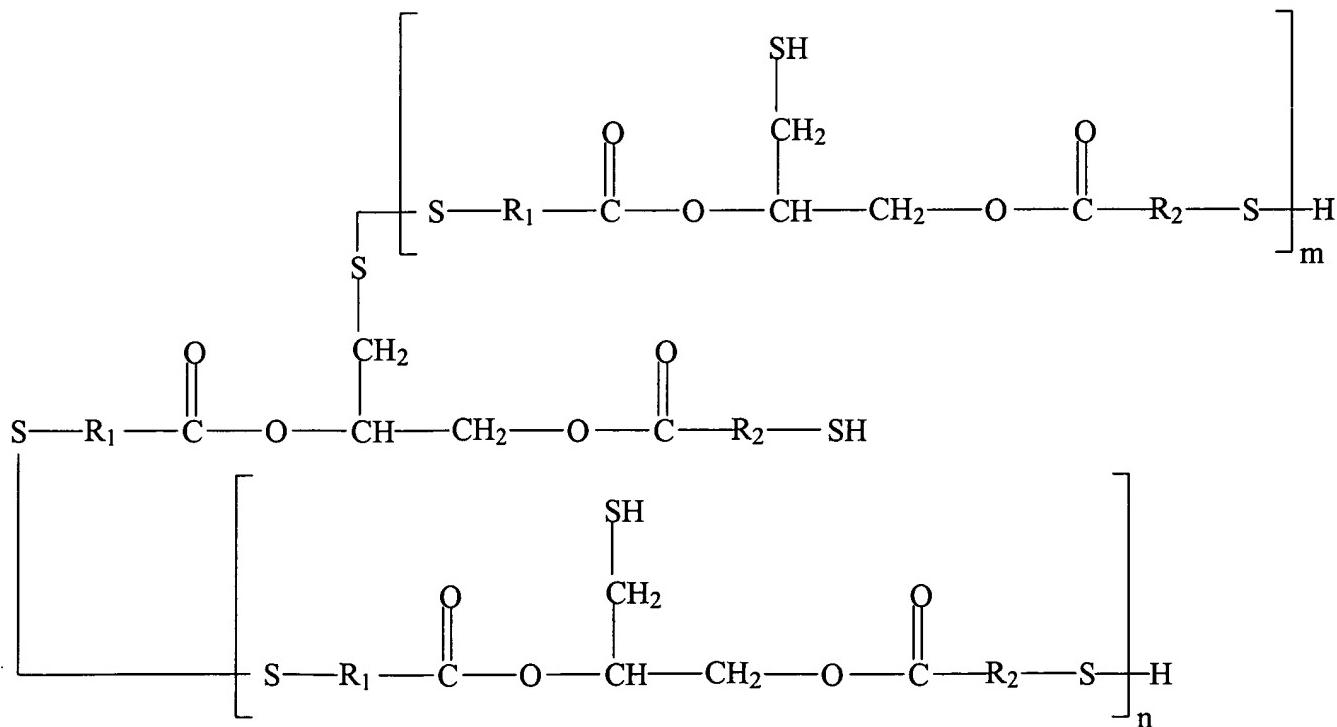
38. (original): The polymerizate of claim 37 wherein said polythiol oligomer has disulfide linkages and is prepared by reacting a polythiol monomer with sulfur in the presence of a basic catalyst.

39. (original): The polymerizate of claim 37 wherein said polythiol oligomer is represented by the general formula:



wherein n is an integer from 1 to 21.

40. (previously presented): The polymerizate of claim 37 wherein said polythiol oligomer is represented by the general formula:

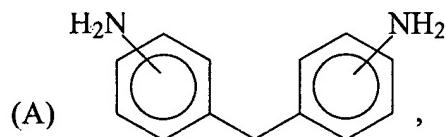


wherein R<sub>1</sub> and R<sub>2</sub> are each independently selected from straight or branched chain alkylene, cyclic alkylene, phenylene or C<sub>1</sub>-C<sub>9</sub> alkyl substituted phenylene and n and m are independently integers from 0 to 21 such that n + m is at least 1.

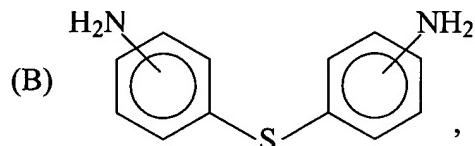
41. (previously presented): The polymerizate of claim 31 wherein said monomer is a material having at least two isocyanate groups.

42. (previously presented): The polymerizate of claim 41 wherein said monomer is selected from the group consisting of α,α'-xylene diisocyanate, α,α,α',α'-tetramethylxylene diisocyanate, isophorone diisocyanate, bis(isocyanatocyclohexyl)methane, ortho-toluidine diisocyanate, ortho-tolylidine diisocyanate, ortho-tolylene diisocyanate and 4,4'-diphenylmethane diisocyanate, and mixtures of said monomers.

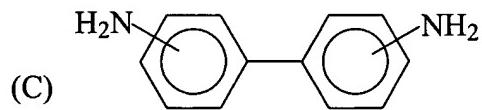
43. (original): The polymerizate of claim 31 wherein said polyamine reactant of said second component is selected from the group consisting of ethylenamines, C<sub>1</sub>-C<sub>3</sub> dialkyl toluenediamine, methylene dianiline, trimethyleneglycol di(para-aminobenzoate), a diamine represented by the general formula (A):



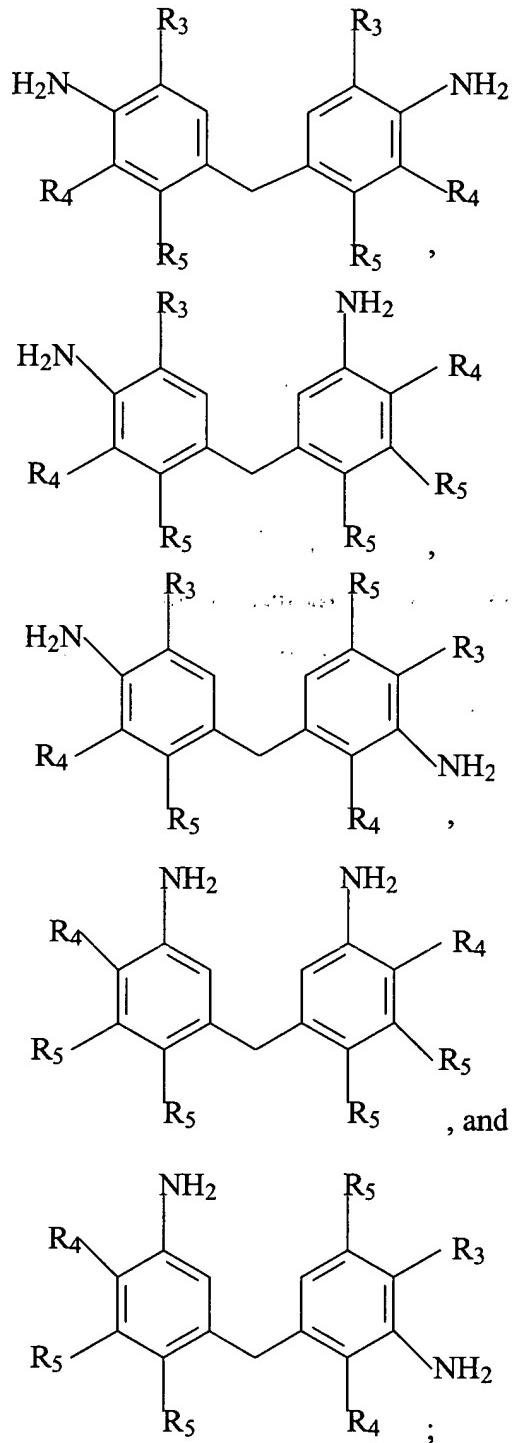
a diamine represented by the general formula (B):



and a diamine represented by the general formula (C):

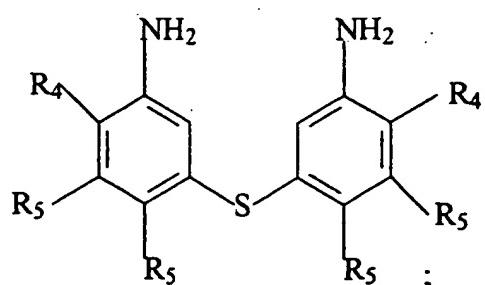
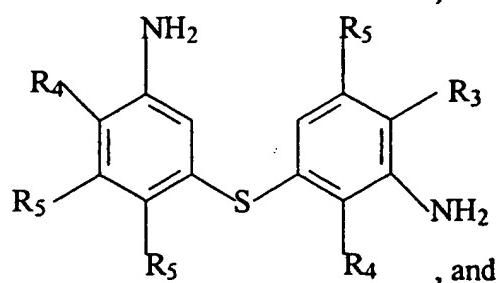
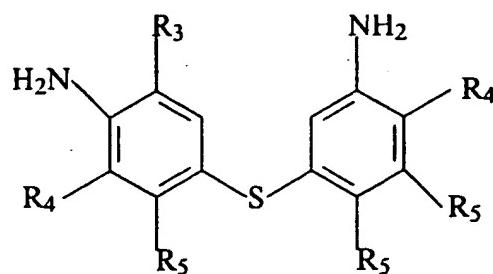
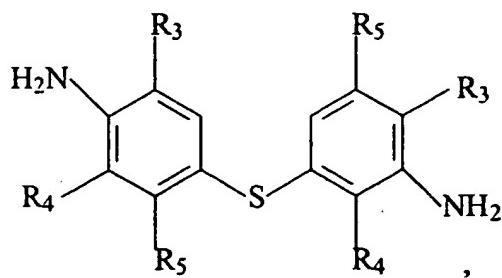
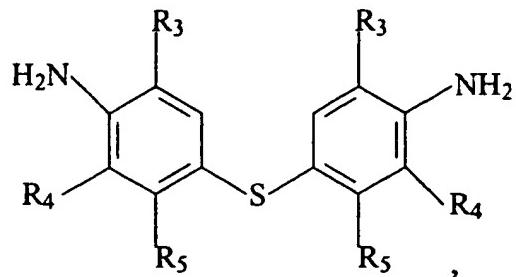


44. (previously presented): The polymerize of claim 43 wherein the diamine of general formula (A) is selected from one or more of the group consisting of:



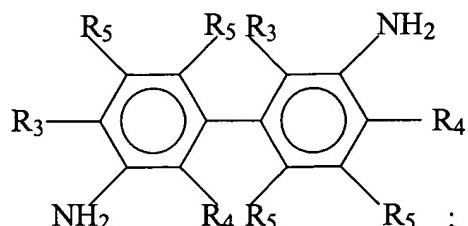
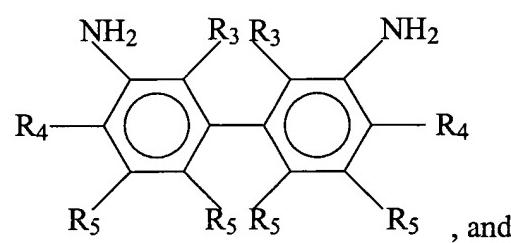
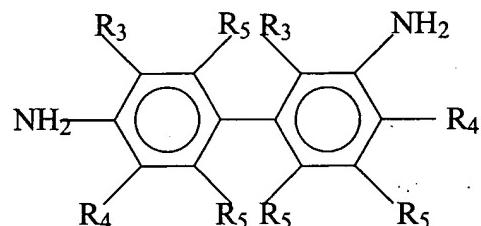
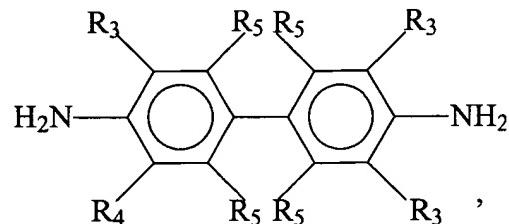
wherein R<sub>3</sub> and R<sub>4</sub> are each independently C<sub>1</sub>-C<sub>3</sub> alkyl, and R<sub>5</sub> is selected from hydrogen or halogen, or mixtures of said diamines.

45. (previously presented): The polymerize of claim 43 wherein the diamine of general formula (B) is selected from one or more of the group consisting of:



wherein R<sub>3</sub> and R<sub>4</sub> are each independently C<sub>1</sub>-C<sub>3</sub> alkyl, and R<sub>5</sub> is selected from hydrogen or halogen, or mixtures of said diamines.

46. (previously presented): The polymerize of claim 43 wherein the diamine of general formula (C) is selected from one or more of the group consisting of:



wherein R<sub>3</sub> and R<sub>4</sub> are each independently C<sub>1</sub>-C<sub>3</sub> alkyl, and R<sub>5</sub> is selected from hydrogen or halogen, or mixtures of said diamines.

47. (original): The polymerize of claim 31 wherein a catalyst is added to said two-component composition to promote the polymerization.

48. (original): The polymerize of claim 47 wherein said catalyst is selected from the group consisting of tertiary amines and organometallic compounds.

49. (original): The polymerize of claim 31 wherein the polymerization process further comprises the step of :

mixing said first component and said second component.

50. (original): The polymerize of claim 31 wherein the polymerization further comprises the step of :

degassing said first component.

51. (original): The polymerize of claim 31 wherein the polymerization further comprises the step of :

degassing said second component.

52. (original): The polymerize of claim 49 wherein the polymerization further comprising the step of:

adding the mixture to a mold.

53. (original): The polymerize of claim 52 wherein the polymerization further comprising the step of:

heating the mold and the mixture of said first component and said second component within it.

54. (original): The polymerize of claim 53 wherein said heating step further includes heating the mold and said mixture to a temperature of up to 200°C over a period of from 0.5 to 72 hours.

55. (original): The polymerizate of claim 31 wherein said first component and said second component are polymerized together in amounts sufficient to provide a molar equivalent ratio of (NCO + NCS) groups to (-NH<sub>2</sub> + -NH-) groups of from 0.5 to 3.0.

56. (previously presented): The polymerizate of claim 31 further comprising additives selected from the group consisting of light stabilizers, heat stabilizers, antioxidants, ultraviolet light absorbers, mold release agents, static (non-photochromic) dyes, pigments or flexibilizing additives or anti-yellowing additives; or mixtures of said additives.

57. (original): The polymerizate of claim 56 wherein the additives are present in said polymerizate in an amount up to 10% by weight of said polymerizate.

58. (original): The polymerizate of claim 31 further comprising a photochromic substance:

59. (previously presented): A photochromic article derived from a non-elastomeric polymerizate prepared by polymerizing a two-component composition comprised of:

(a) a first component containing at least one reactant having at least two functional groups selected from isocyanate, isothiocyanate or combinations thereof, the reactant being the reaction product of,

(i) a polythiol monomer having at least two thiol groups; and  
(ii) a monomer having at least two functional groups selected from isocyanate, isothiocyanate or combinations thereof; and

(b) a second component containing at least one polyamine reactant having at least two functional groups selected from primary amine, secondary amine or combinations thereof.

60. (original): The photochromic article of claim 59 wherein said first component further comprises (iii) a reactive hydrogen material having at least two reactive hydrogen

groups, the reactive hydrogen material being selected from the group consisting of polyols and materials having both hydroxyl and thiol groups, and mixtures thereof.

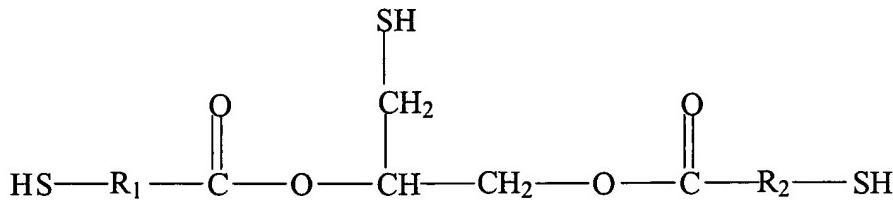
61. (original): The photochromic article of claim 59 wherein the relative amounts of (i) and (ii) in said first component are selected such that the molar equivalents ratio of (NCO + NCS)/(SH) is greater than 1.0.

62. (original): The photochromic article of claim 60 wherein the relative amounts of (i), (ii) and (iii) being in said first component are selected such that the molar equivalents ratio of (NCO + NCS)/(SH + OH) is greater than 1.0.

63. (original): The photochromic article of claim 59 wherein said first component and said second component are selected such that when they are polymerized, the resulting polymerizate has a refractive index of at least 1.6, an Abbe number of at least 33 and an initial Barcol hardness of at least 1.

64. (original): The photochromic article of claim 60 wherein the relative amounts of (i), (ii) and (iii) are selected such that the molar equivalents ratio of (NCO + NCS)/(SH + OH) is from 1.2:1.0 to 4.0:1.0.

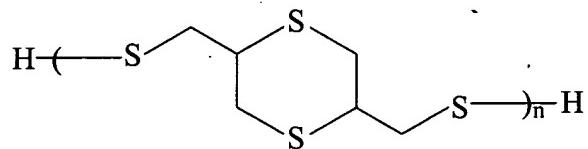
65. (original): The photochromic article of claim 59 wherein said polythiol monomer is selected from the group consisting of 2,5-dimercaptomethyl-1,4-dithiane, 2,2'-thiodiethanethiol, pentaerythritol tetrakis(3-mercaptopropionate), pentaerythritol tetrakis(2-mercaptopropionate), trimethylolpropane tris(3-mercaptopropionate), trimethylolpropane tris(2-mercaptopropionate), 4-mercaptopropyl-3,6-dithia-1,8-octanedithiol, 4-tert-butyl-1,2-benzenedithiol, 4,4'-thiodibenzene-1,2-dithiol, ethylene glycol di(2-mercaptopropionate), ethylene glycol di(3-mercaptopropionate), poly(ethylene glycol) di(2-mercaptopropionate) and poly(ethylene glycol) di(3-mercaptopropionate), a polythiol represented by the general formula:



wherein R<sub>1</sub> and R<sub>2</sub> are each independently selected from straight or branched chain alkylene, cyclic alkylene, phenylene and C<sub>1</sub>-C<sub>9</sub> alkyl substituted phenylene, and oligomers of said polythiols; and mixtures of said polythiol monomers.

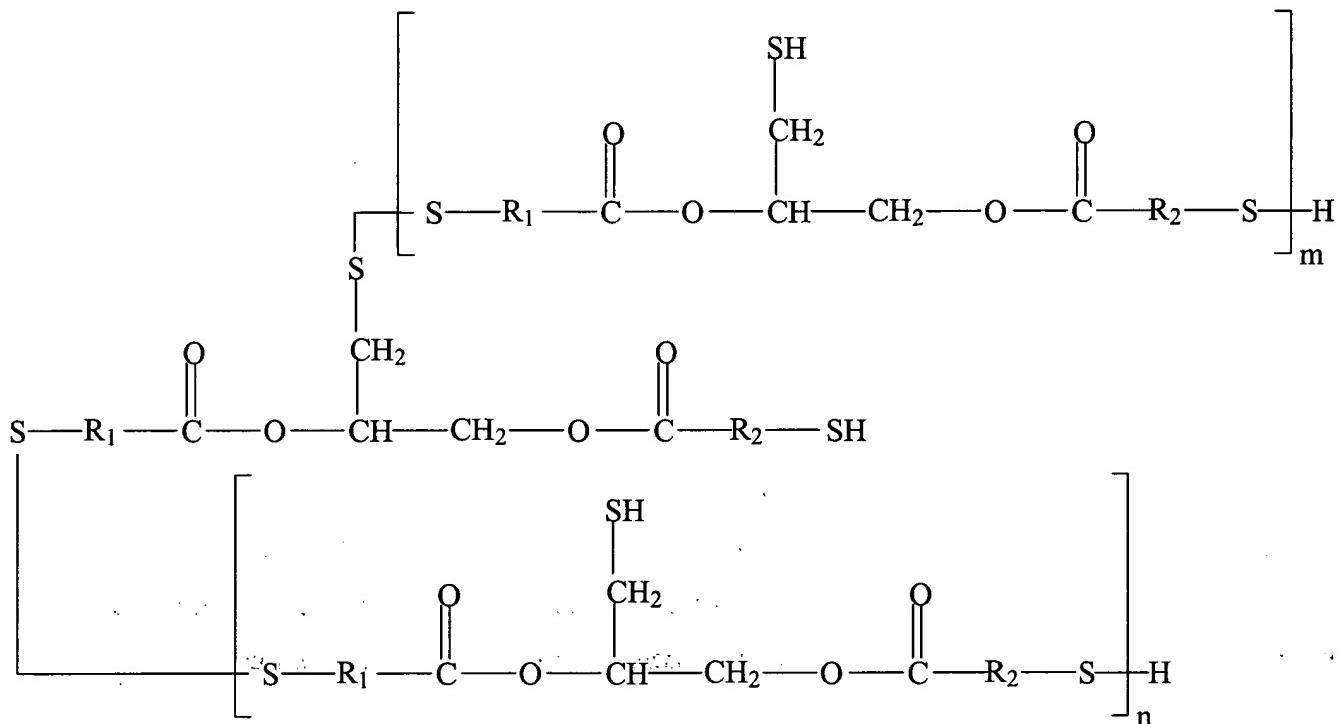
66. (original): The photochromic article of claim 65 wherein said polythiol oligomer has disulfide linkages and is prepared by reacting a polythiol monomer with sulfur in the presence of a basic catalyst.

67. (original): The photochromic article of claim 65 wherein said polythiol oligomer is represented by the general formula:



wherein n is an integer from 1 to 21.

68. (previously presented): The photochromic article of claim 65 wherein said polythiol oligomer is represented by the general formula:

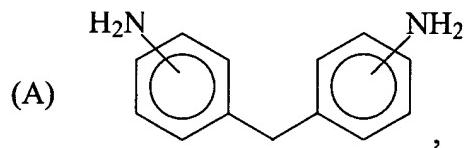


wherein  $R_1$  and  $R_2$  are each independently selected from straight or branched chain alkylene, cyclic alkylene, phenylene or  $C_1-C_9$  alkyl substituted phenylene and  $n$  and  $m$  are independently integers from 0 to 21 such that  $n + m$  is at least 1.

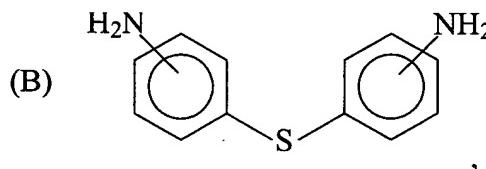
69. (previously presented): The photochromic article of claim 59 wherein said monomer is a material having at least two isocyanate groups.

70. (previously presented): The photochromic article of claim 69 wherein said monomer is selected from the group consisting of  $\alpha,\alpha'$ -xylene diisocyanate,  $\alpha,\alpha,\alpha',\alpha'$ -tetramethylxylene diisocyanate, isophorone diisocyanate, bis(isocyanatocyclohexyl)methane, ortho-toluidine diisocyanate, ortho-tolylidine diisocyanate, ortho-tolylene diisocyanate and 4,4'-diphenylmethane diisocyanate, and mixtures of said monomers.

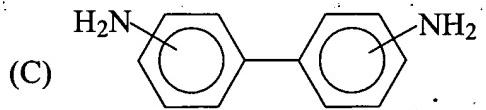
71 . (original): The photochromic article of claim 59 wherein said polyamine reactant of said second component is selected from the group consisting of ethyleneamines, C<sub>1</sub>-C<sub>3</sub> dialkyl toluenediamine, methylene dianiline, trimethyleneglycol di(para-aminobenzoate), a diamine represented by the general formula (A):



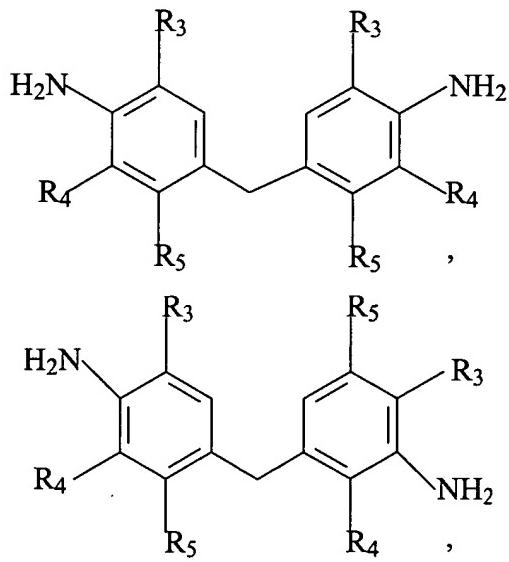
a diamine represented by the general formula (B):

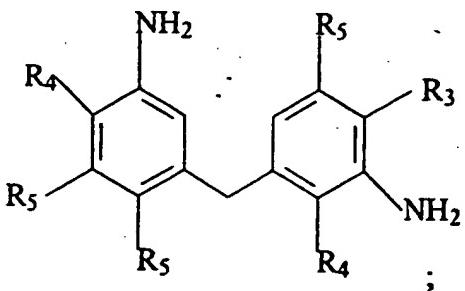
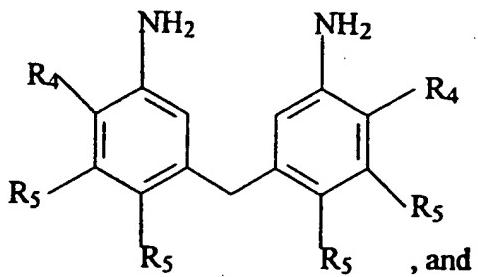
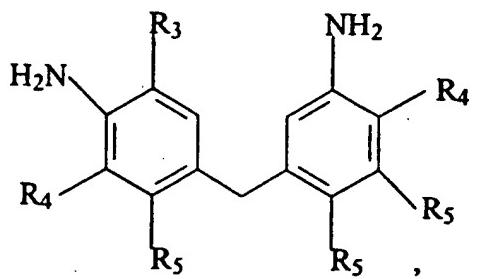


and a diamine represented by the general formula (C):



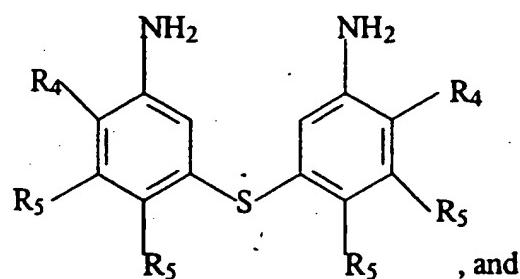
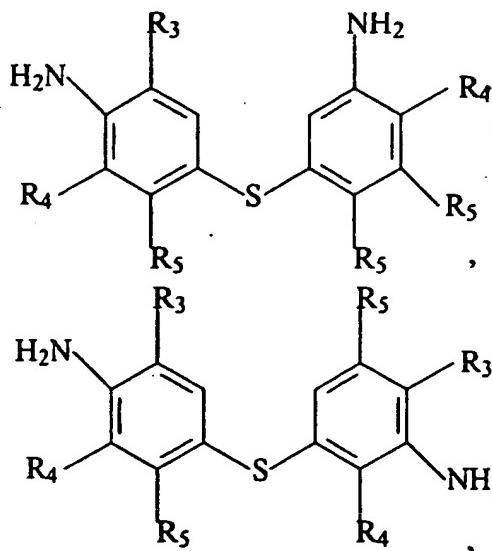
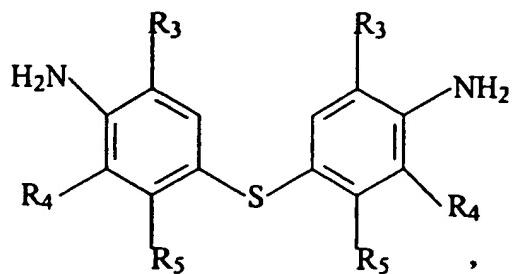
72. (previously presented): The photochromic article of claim 71 wherein the diamine of general formula (A) is selected from one or more of the group consisting of:



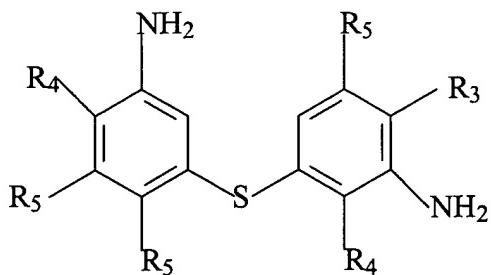


wherein R<sub>3</sub> and R<sub>4</sub> are each independently C<sub>1</sub>-C<sub>3</sub> alkyl, and R<sub>5</sub> is selected from hydrogen or halogen, or mixtures of said diamines.

73. (previously presented): The photochromic article of claim 71 wherein the diamine of general formula (B) is selected from one or more of the group consisting of:

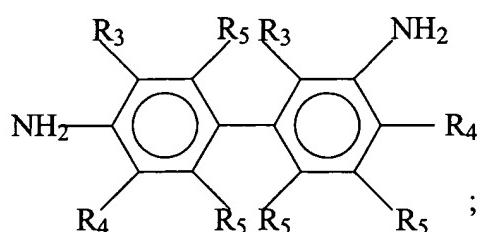
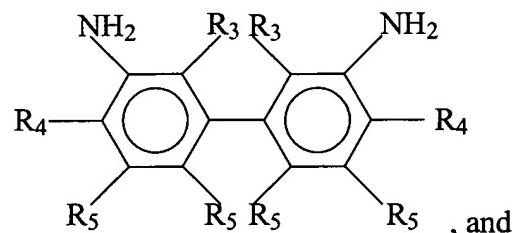
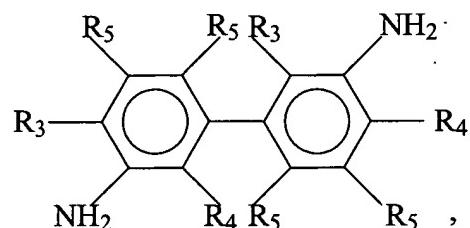
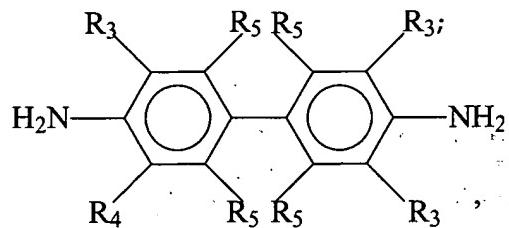


, and



wherein R<sub>3</sub> and R<sub>4</sub> are each independently C<sub>1</sub>-C<sub>3</sub> alkyl, and R<sub>5</sub> is selected from hydrogen or halogen, or mixtures of said diamines.

74. (previously presented): The photochromic article of claim 71 wherein the diamine of general formula (C) is selected from one or more of the group consisting of:



wherein R<sub>3</sub> and R<sub>4</sub> are each independently C<sub>1</sub>-C<sub>3</sub> alkyl, and R<sub>5</sub> is selected from hydrogen or halogen, or mixtures of said diamines.

75. (original): The photochromic article of claim 59 wherein a catalyst is added to said two-component composition to promote the polymerization.

76. (original): The photochromic article of claim 75 wherein said catalyst is selected from the group consisting of tertiary amines and organometallic compounds.

77. (original): The photochromic article of claim 59 wherein the polymerization process further comprises the step of :

mixing said first component and said second component.

78. (original): The photochromic article of claim 59 wherein the polymerization process further comprises the step of :

degassing the said first component.

79. (original): The photochromic article of claim 59 wherein the polymerization process further comprises the step of :

degassing the said second component.

80. (original): The photochromic article of claim 59 wherein the polymerization process further comprises the step of :

adding a mixture of said first component and said second component to a mold.

81. (original): The photochromic article of claim 80 wherein the polymerization process further comprises the step of :

heating the mold and said mixture within it.

82. (original): The photochromic article of claim 81 wherein said heating step further includes heating the mold and said mixture to a temperature of up to 200°C over a period of from 0.5 to 72 hours.

83. (original): The photochromic article of claim 59 wherein said first component and said second component are polymerized together in amounts sufficient to provide a molar equivalent ratio of (NCO + NCS) groups to (-NH<sub>2</sub> + -NH-) groups of from 0.5 to 3.0.

84. (original): The photochromic article of claim 59 further comprising additives selected from the group consisting of light stabilizers, heat stabilizers, antioxidants, ultraviolet light absorbers, mold release agents, static (non-photochromic) dyes, pigments and flexibilizing additives and anti-yellowing additives; and mixtures of said additives.

85. (original): The photochromic article of claim 84 wherein the additives are present in said polymerizate in an amount up to 10% by weight of said polymerizate.

86. (original): The photochromic article of claim 59 further comprising a photochromic substance.

87. (original): The photochromic article of claim 86 wherein the photochromic substance is mixed with said first component.

88. (original): The photochromic article of claim 86 wherein the photochromic substance is mixed with said second component.

89. (original): The photochromic article of claim 86 wherein the photochromic substance is applied to said photochromic article at from 0.15 to 0.35 milligrams per square centimeter of surface area of said photochromic article.

90. (original): The photochromic article of claim 86 wherein said photochromic substance is selected from the group consisting of spiro(indoline)naphthoxazines, spiro(indoline)benzoxazines, chromenes, benzopyrans, naphthopyrans, organo-metal dithizonates, (arylazo)-thioformic arylhydrazides, mercury dithizonates, fulgides, fulgimides, 3-furyl fulgides, 3-thienyl fulgides, 3-furyl fulgimides and 3-thienyl fulgimide; and mixtures of said photochromic substances.

91. (original): The photochromic article of claim 86 wherein the photochromic substance has an activated absorption maximum within the visible range of from 590 to 700 nanometers.

92. (original): The photochromic article of claim 86 wherein the photochromic substance has an activated absorption maximum within the visible range of from 400 to 500 nanometers.

93. (original): The photochromic article of claim 86 wherein the photochromic substance has an activated absorption maximum within the visible range of from 500 to 700 nanometers.

94. (original): The photochromic article of claim 86 wherein the photochromic substance is applied or incorporated into said photochromic article using a method selected from the list consisting of cast curing, encapsulating within a matrix of an organic polymerizate and incorporating into the two-component composition prior to curing.

95. (original): The photochromic article of claim 86 wherein the photochromic substance is applied by imbibing the photochromic article such that permeation of the photochromic substance into the polymerizate is achieved.

96. (original): The photochromic article of claim 95 wherein the imbibing process includes solvent assisted transfer absorption.

97. (original): The photochromic article of claim 95 wherein the imbibing process includes vapor phase transfer.

98. (original): The photochromic article of claim 95 wherein the photochromic substance is applied as a coating to the surface of the photochromic article.

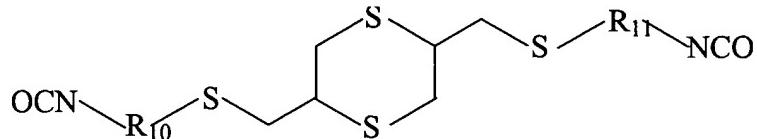
99. (original): The photochromic article of claim 95 wherein the imbibing process includes the steps of:

coating the photochromic article with the photochromic substance;  
heating the surface of the photochromic article; and  
removing the residual coating from the surface of the photochromic article.

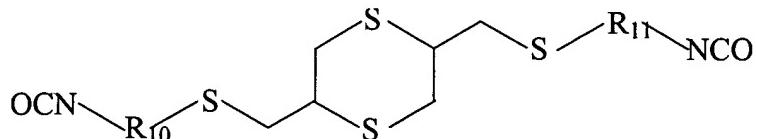
100. (original): The photochromic article of claim 86 wherein the photochromic article is an optical lens for correcting a visual defect.

101. (previously presented): The photochromic article of claim 59 wherein said monomer has contains one or more sulfur atoms in its backbone.

102. (previously presented): The photochromic article of claim 101 wherein the monomer containing one or more sulfur atoms in its backbone has the general structure: wherein R<sub>10</sub> and R<sub>11</sub> are each independently C<sub>1</sub> to C<sub>3</sub> alkyl.



103. (previously presented): The polymerize of claim 31 wherein the monomer containing one or more sulfur atoms in its backbone has the general structure:



wherein R<sub>10</sub> and R<sub>11</sub> are each independently C<sub>1</sub> to C<sub>3</sub> alkyl.

## **EVIDENCE APPENDIX**

None

**RELATED PROCEEDINGS APPENDIX**

None